REMARKS

Claims 1, 2, 4-27, and 32-41 are pending in the application.

Please enter and consider the AMENDMENT AFTER FINAL UNDER 37 C.F.R. 1.116 filed on September 3, 2002.

A copy of the claims as currently pending was attached to the AMENDMENT AFTER FINAL UNDER 37 C.F.R. § 1.116 filed on September 3, 2002, for the Examiner's convenience.

Claims 1, 7, 8, 12, 14, 15, 17, 20, 25, 34, 35, and 36 are independent. Applicant respectfully urges that all independent claims are in condition for allowance. Each independent claim is individually discussed hereinbelow.

Further, Applicant respectfully urges that each dependent claim, standing alone, is allowable over all cited art, and is therefore in condition for allowance.

Because the wording and details of the invention are set out differently in the various independent claims, Applicant makes the following distinctions between the claimed invention and the cited art.

At page 3 of the FINAL Action Office Action MAILED ON July 2, 2002, claims 1, 2, 4-27, and 32-41 were rejected under 35 U.S.C. § 103(a) as being unpatentable over applicant's admitted prior art in view of Hermanns et al U. S. Patent No. 4,964,582 issued October 23, 1990 (hereinafter Hermanns) and Macchia U. S. Patent No. 4,399,953 issued August 23, 1983 (hereinafter Macchia).

The claimed invention as set out in representative claim 1, comprises in part:

1. A system for measuring tape pack radii, comprising:

a tape supply reel, said tape supply reel rotating as a tape leaves said tape supply reel during a tape transfer process;

a tape take-up reel for receiving tape from said tape supply reel, said tape take-up reel rotating to receive said tape during said tape transfer process;

a first angular position transducer to measure an angular position of said tape supply reel;

a second angular position transducer to measure an angular position of said tape take-up reel;

a third angular position transducer to measure an angular position of a mechanical device, said mechanical device changing said angular position as said tape leaves said tape supply reel and is received by said tape take-up reel;

a processor having a Kalman filter, said Kalman filter responsive to one or both of an angular position measurement by said first angular position transducer and an angular position measurement by said second angular position transducer and also responsive to an angular position measurement by said third angular position transducer, to calculate an updated estimate of one or both of a supply radius of a tape pack on said tape supply reel and a take-up radius of a tape pack on said tape take-up reel;

a servo-controller, responsive to one or both of said supply radius and said take-up radius, to control rotation of said tape supply reel and said tape take-up reel.

Applicant's admitted prior art refers to pages 2-3 of the specification in the BACKGROUND section, and this section is set out in full in the AMENDMENT AFTER FINAL UNDER 37 C.F.R. § 1.116 filed on September 3, 2002. In the above mentioned BACKGROUND text, Applicant simply points out that prior methods of calculating tape pack radius are deficient, for a plurality of reasons. Further, the text points out that better methods of calculating tape pack radius are needed.

Hermanns describes a system for detecting bobbin circumference including both a drive drum (supply reel) and a take-up bobbin (take-up reel). The Hermanns system (Fig. 1) exclusively utilizes a rotational angle sensor located on the drive drum and a rotational angle sensor located on the take-up bobbin. See col. 8, lines 67-68 and col. 9, lines 1-5. Furthermore, Hermanns describes an apparatus that can calculate bobbin circumference from either

a single angular position sensor located on the take-up bobbin or, alternately, calculates the value by combining data from the sensors on both the drive drum and the take-up bobbin. See col. 7, lines 28-34 and col. 8, lines 7-11. In this process, Hermanns uses a Kalman filter to estimate the tape-pack (bobbin) diameter indirectly by estimating initial diameter d_{0k} and tape (yarn) thickness δ_k first, and then performing additional processing steps to determine the desired result. See col. 4, lines 15-20 and col. 5, lines 1-2.

Macchia describes a system for ensuring constant cable pay out velocity despite pay out sheave (supply reel) replacements performed as the cable is being unwound. Two storage idler rollers (idler reels) with variable separation maintain a controlled length of slack in the cable. When the supply reel is being replaced, the idler reels are drawn together, reducing the length of slack, and providing cable for payout. A single position sensor is utilized, responsive, to separation of the idler reels . See col. 2, lines 50-53. The Macchia patent suggest using a Kalman filter with data from this single sensor to estimate the velocity at which the idler reels are drawn together. See col. 5, lines 44-46.

Applicant respectfully urges that Applicant's claimed novel ***a third angular position transducer to measure an angular position of a mechanical device, said mechanical device changing said angular position as said tape leaves said tape supply reel and is received by said tape take-up reel*** where measurements from the third angular position transducer serve as input to ***a processor having a Kalman filter*** and ***a servo-controller, responsive to one or both of said supply radius and said take-up radius, to control rotation of said tape supply reel and said tape take-up reel*** are absent from all cited art, including Applicant's admitted prior art, Hermanns and Macchia.

Applicant respectfully urges that the cited art is legally precluded from rendering the claimed invention obvious under 35 U.S.C. 103 because of the total absence in any of the cited art of Applicant's claimed ***a third angular position transducer to measure an angular***

position of a mechanical device, said mechanical device changing said angular position as said tape leaves said tape supply reel and is received by said tape take-up reel, where measurements from the third angular position transducer serve as input to ***a processor having a Kalman filter*** and ***a servo-controller, responsive to one or both of said supply radius and said take-up radius, to control rotation of said tape supply reel and said tape take-up reel***

Further, an analysis under *Graham v. Deere*, 383 U.S. 1, 148 U.S.P.Q. 459, (1966), and cited in MPEP 706.02 (m), comes to the same conclusion, that the claimed invention is novel and non-obvious. The three analytic criteria under *Graham v. Deer* are:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.

3. Resolving the level of ordinary skill in the pertinent art.

Further, objective evidence present in the application indicating obviousness or nonobviousness is considered.

Using these analytic criteria, one then makes a legal determination as to whether or not a person of ordinary skill in the pertinent art would have found the claimed invention at the time that the invention was made.

First, the scope and content of the prior art is determined by reference to the cited three items, Applicant's Background statement, Hermanns, and Macchia. The scope and content of the prior art is summarized as:

A. Applicant's Background art mentions that tape pack radius is calculated in the past, and that the past methods are inadequate.

B. Hermanns discloses "a system for detecting bobbin circumference including both a drive drum (supply reel) and a take-up bobbin (take-up reel). The Hermanns system (Fig. 1) exclusively utilizes a rotational angle sensor located on the drive drum and a rotational angle sensor located on the take-up bobbin."

C. Macchia discloses "Two storage idler rollers (idler reels) with variable separation maintain a controlled length of slack in the cable. When the supply reel is being replaced, the idler reels are drawn together, reducing the length of slack, and providing cable for pay-out. A single position sensor is utilized, responsive, to separation of the idler reels."

2. The differences between the claimed invention and the cited art are, as set out in the claimed invention:

a third angular position transducer to measure an angular position of a mechanical device, said mechanical device changing said angular position as said tape leaves said tape supply reel and is received by said tape take-up reel;

a processor having a Kalman filter, said Kalman filter responsive to one or both of an angular position measurement by said first angular position transducer and an angular position measurement by said second angular position transducer and also responsive to an angular position measurement by said third angular position transducer, to calculate an updated estimate of one or both of a supply radius of a tape pack on said tape supply reel and a take-up radius of a tape pack on said tape take-up reel;

a servo-controller, responsive to one or both of said supply radius and said take-up radius, to control rotation of said tape supply reel and said tape take-up reel.

Applicant respectfully urges that none of the cited art show a processor having a Kalman filter, where the Kalman filter is ***responsive to one or both of an angular position measurement by said first angular position transducer and an angular position measurement by said second angular position transducer and also responsive to an angular position measurement by said third angular position transducer***

3. The level of ordinary skill in the art of tape drive design art can be ascertained by reference to Applicant's Background statement that the present methods of estimating tape pack radius are inadequate.

The level of ordinary skill in the art of Kalman filters can be ascertained from Hermans and Macchia as measuring at most two angular coordinates, and thereby estimating the thread on a bobbin, or the cable played out on reels and sheaves. Nowhere is the use of three angular measurements mentioned in the cited art as input to a Kalman filter, for the estimation of either bobbin radius or amount of cable played out. Further, none of the cited patents mention any use of Kalman filters in estimating tape pack radius in a system having a tape supply reel and a tape take up reel.

Further, there is no mention, in Applicant's BACKGROUND section of a Kalman filter applied to the problem of estimating tape pack radius in a system having a tape supply reel and a tape take up reel.

Accordingly, the legal conclusion drawn from the facts, by the application of the legal rules of the *Graham v. Deere* analytic method, is that a person of ordinary skill in the art of the cited art could not have found the present invention obvious, because of the absence of the claimed elements of the presently claimed invention in all of the cited art.

The claimed invention as set out in representative claim 7, comprises in part:

> 7. A system for measuring a length of tape available for a record operation, comprising:
>
> a tape supply reel, said tape supply reel rotating as a tape leaves said tape supply reel during a tape transfer process;
>
> a tape take-up reel for receiving tape from said tape supply reel, said tape take-up reel rotating to receive said tape during said tape transfer process;
>
> a first angular position transducer to measure an angular position of said tape supply reel;

a second angular position transducer to measure an angular position of said tape take-up reel;

a third angular position transducer responsive to movement of said tape;

a processor having a Kalman filter, said Kalman filter responsive to one or both of an angular position measurement by said first angular position transducer and an angular position measurement by said second angular position transducer and also responsive to an angular position measurement by said third angular position transducer, to determine an updated estimate of one or both of a supply radius of a tape pack on said tape supply reel and a take-up radius of a tape pack on said tape take-up reel for calculating said available length of tape; and

a servo-controller, responsive to one or both of said supply radius and said take-up radius, to control rotation of said tape supply reel and said tape take-up reel.

Applicant's admitted prior art, Hermanns, and Macchia are described hereinabove, and that description will not be repeated.

Applicant respectfully urges that Applicant's claimed novel ***a third angular position transducer responsive to movement of said tape***, where measurements from the third angular position transducer serve as input to ***a processor having a Kalman filter*** and ***a servo-controller, responsive to one or both of said supply radius and said take-up radius, to control rotation of said tape supply reel and said tape take-up reel*** are absent from all cited art, including Applicant's admitted prior art, Hermanns and Macchia.

Applicant respectfully urges that the cited art is legally precluded from rendering the claimed invention obvious under 35 U.S.C. 103 because of the total absence in any of the cited art of Applicant's claimed ***a third angular position transducer responsive to movement of said tape***, where measurements from the third angular position transducer serve as input to ***a processor having a Kalman filter*** and ***a servo-controller, responsive to one or both of said supply radius and said take-up radius, to control rotation of said tape supply reel and said tape take-up reel***

Further, an analysis under *Graham v. Deere*, 383 U.S. 1, 148 U.S.P.Q. 459, (1966), and cited in MPEP 706.02 (m), comes to the same conclusion, that the claimed invention is novel and non-obvious. The three analytic criteria under *Graham v. Deer* are:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.

3. Resolving the level of ordinary skill in the pertinent art.

Further, objective evidence present in the application indicating obviousness or nonobviousness is considered.

Using these analytic criteria, one then makes a legal determination as to whether or not a person of ordinary skill in the pertinent art would have found the claimed invention at the time that the invention was made.

First, the scope and content of the prior art is determined by reference to the cited three items, Applicant's Background statement, Hermanns, and Macchia. The scope and content of the prior art is summarized as:

A. Applicant's Background art mentions that tape pack radius is calculated in the past, and that the past methods are inadequate.

B. Hermanns discloses "a system for detecting bobbin circumference including both a drive drum (supply reel) and a take-up bobbin (take-up reel). The Hermanns system (Fig. 1) exclusively utilizes a rotational angle sensor located on the drive drum and a rotational angle sensor located on the take-up bobbin."

C. Macchia discloses "Two storage idler rollers (idler reels) with variable separation maintain a controlled length of slack in the cable. When the supply reel is being replaced, the idler reels are drawn together, reducing the length of slack, and providing cable for pay-out. A single position sensor is utilized, responsive, to separation of the idler reels."

2. The differences between the claimed invention and the cited art are, as set out in the claimed invention:

> ***a third angular position transducer responsive to movement of said tape;***
> ***a processor having a Kalman filter, said Kalman filter responsive to one or both of an angular position measurement by said first angular position transducer and an angular position measurement by said second angular position transducer and also responsive to an angular position measurement by said third angular position transducer, to determine an updated estimate of one or both of a supply radius of a tape pack on said tape supply reel and a take-up radius of a tape pack on said tape take-up reel for calculating said available length of tape; and***
> ***a servo-controller, responsive to one or both of said supply radius and said take-up radius, to control rotation of said tape supply reel and said tape take-up reel***

Applicant respectfully urges that none of the cited art show a processor having a Kalman filter, where the Kalman filter is ***responsive to one or both of an angular position measurement by said first angular position transducer and an angular position measurement by said second angular position transducer and also responsive to an angular position measurement by said third angular position transducer***

3. The level of ordinary skill in the art of tape drive design art can be ascertained by reference to Applicant's Background statement that the present methods of estimating tape pack radius are inadequate.

The level of ordinary skill in the art of Kalman filters can be ascertained from Hermans and Macchia as measuring at most two angular coordinates, and thereby estimating the thread on a bobbin, or the cable played out on reels and sheaves. Nowhere is the use of three angular measurements mentioned in the cited art as input to a Kalman filter, for the estimation of either bobbin radius or amount of cable played out. Further, none of the cited patents

mention any use of Kalman filters in estimating tape pack radius in a system having a tape supply reel and a tape take up reel.

Further, there is no mention, in Applicant's BACKGROUND section of a Kalman filter applied to the problem of estimating tape pack radius in a system having a tape supply reel and a tape take up reel.

Accordingly, the legal conclusion drawn from the facts, by the application of the legal rules of the *Graham v. Deere* analytic method, is that a person of ordinary skill in the art of the cited art could not have found the present invention obvious, because of the absence of the claimed elements of the presently claimed invention in all of the cited art.

The claimed invention, as set out in representative claim 8, comprises in part:

> 8. A method for estimating a radius of a tape on a supply reel and on a take-up reel, comprising:
> ***measuring a first angular position of a tape supply reel;***
> ***measuring a second angular position of a tape take-up reel;***
> ***measuring a third angular position of a capstan that rotates to transfer the tape between said tape supply and take-up reels; and,***
> ***estimating by a processor employing a Kalman filter a radius of a tape pack on said supply reel and a radius of a tape pack on said take-up reel, in response to said first angular position of said tape supply reel, said second angular position of said tape take-up reel, and said third angular position of said capstan.***

Applicant respectfully urges that Applicant's claimed novel

> ***measuring a first angular position of a tape supply reel;***
> ***measuring a second angular position of a tape take-up reel;***
> ***measuring a third angular position of a capstan that rotates to transfer the tape between said tape supply and take-up reels; and,***
> ***estimating by a processor employing a Kalman filter a radius of a tape pack on said supply reel and a radius of a tape pack on said take-up reel, in response to***

said first angular position of said tape supply reel, said second angular position of said tape take-up reel, and said third angular position of said capstan.

are absent from all cited art, including Applicant's admitted prior art, Hermanns and Macchia.

Applicant respectfully urges that the cited art is legally precluded from rendering the claimed invention obvious under 35 U.S.C. 103 because of the total absence in any of the cited art of Applicant's claimed novel structure as recited in claim 8 hereinabove.

Further, an analysis applied to independent claim 8 under *Graham v. Deere*, 383 U.S. 1, 148 U.S.P.Q. 459, (1966), and cited in MPEP 706.02 (m), comes to the same conclusion, that the claimed invention is novel and non-obvious. The three analytic criteria under *Graham v. Deer* are:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.

3. Resolving the level of ordinary skill in the pertinent art.

Further, objective evidence present in the application indicating obviousness or nonobviousness is considered.

Using these analytic criteria, one then makes a legal determination as to whether or not a person of ordinary skill in the pertinent art would have found the claimed invention at the time that the invention was made.

First, the scope and content of the prior art is determined by reference to the cited three items, Applicant's Background statement, Hermanns, and Macchia. The scope and content of the prior art is summarized as:

A. Applicant's Background art mentions that tape pack radius is calculated in the past, and that the past methods are inadequate.

B. Hermanns discloses "a system for detecting bobbin circumference including both a drive drum (supply reel) and a take-up bobbin (take-up reel). The Hermanns system (Fig. 1) exclusively utilizes a rotational angle sensor located on the drive drum and a rotational angle sensor located on the take-up bobbin."

C. Macchia discloses "Two storage idler rollers (idler reels) with variable separation maintain a controlled length of slack in the cable. When the supply reel is being replaced, the idler reels are drawn together, reducing the length of slack, and providing cable for pay-out. A single position sensor is utilized, responsive, to separation of the idler reels."

2. The differences between the claimed invention and the cited art are, as set out in the claimed invention:

> A method for estimating a radius of a tape on a supply reel and on a take-up reel, comprising:
> ***measuring a first angular position of a tape supply reel;***
> ***measuring a second angular position of a tape take-up reel;***
> ***measuring a third angular position of a capstan that rotates to transfer the tape between said tape supply and take-up reels; and,***
> ***estimating by a processor employing a Kalman filter a radius of a tape pack on said supply reel and a radius of a tape pack on said take-up reel, in response to said first angular position of said tape supply reel, said second angular position of said tape take-up reel, and said third angular position of said capstan.***

Applicant respectfully urges that none of the cited art show a processor having a Kalman filter, where the Kalman filter is responsive to,

measuring a first angular position of a tape supply reel;

measuring a second angular position of a tape take-up reel;

measuring a third angular position of a capstan that rotates to transfer the tape between said tape supply and take-up reels.

3. The level of ordinary skill in the art of tape drive design art can be ascertained by reference to Applicant's Background statement that the present methods of estimating tape pack radius are inadequate.

The level of ordinary skill in the art of Kalman filters can be ascertained from Hermans and Macchia as measuring at most two angular coordinates, and thereby estimating the thread on a bobbin, or the cable played out on reels and sheaves. Nowhere is the use of three angular measurements mentioned in the cited art as input to a Kalman filter, for the estimation of either bobbin radius or amount of cable played out. Further, none of the cited patents mention any use of Kalman filters in estimating tape pack radius in a system having a tape supply reel and a tape take up reel.

Further, there is no mention, in Applicant's BACKGROUND section of a Kalman filter applied to the problem of estimating tape pack radius in a system having a tape supply reel and a tape take up reel.

Accordingly, the legal conclusion drawn from the facts, by the application of the legal rules of the *Graham v. Deere* analytic method, is that a person of ordinary skill in the art of the cited art could not have found the present invention obvious, because of the absence of the claimed elements of the presently claimed invention in all of the cited art.

The claimed invention, as set out in representative claim 12, comprises in part:

> 12. A method for estimating a length of tape on at least one reel, comprising:
> ***measuring a first angular position of a tape supply reel of said at least one reel;***
> ***measuring a second angular position of a tape take-up reel of said at least one reel;***
> ***measuring a third angular position in response to movement of said tape; and,***
> ***estimating by a processor employing a Kalman filter said length of tape on said at least one reel, in response to said first angular position of said tape supply***

reel, said second angular position of said tape take-up reel, and said third angular position in response to movement of said tape.

Applicant respectfully urges that Applicant's claimed novel

measuring a first angular position of a tape supply reel of said at least one reel;
measuring a second angular position of a tape take-up reel of said at least one reel;
measuring a third angular position in response to movement of said tape; and,
estimating by a processor employing a Kalman filter said length of tape on said at least one reel, in response to said first angular position of said tape supply reel, said second angular position of said tape take-up reel, and said third angular position in response to movement of said tape.

are absent from all cited art, including Applicant's admitted prior art, Hermanns and Macchia.

Applicant respectfully urges that the cited art is legally precluded from rendering the claimed invention obvious under 35 U.S.C. 103 because of the total absence in any of the cited art of Applicant's claimed

estimating by a processor employing a Kalman filter said length of tape on said at least one reel, in response to said first angular position of said tape supply reel, said second angular position of said tape take-up reel, and said third angular position in response to movement of said tape.

Again, an analysis under *Graham v. Deere*, 383 U.S. 1, 148 U.S.P.Q. 459, (1966), and cited in MPEP 706.02 (m), comes to the same conclusion, that the claimed invention is novel and non-obvious.

The three analytic criteria under *Graham v. Deer* are:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

Particularly, the absence of the claimed

> ***estimating by a processor employing a Kalman filter said length of tape on said at least one reel, in response to said first angular position of said tape supply reel, said second angular position of said tape take-up reel, and said third angular position in response to movement of said tape.***

in all cited art leads to the conclusion that the differences between the prior art and the claims at issue could not be obvious to a person skilled in the art, under the legal criteria set out in *Grahm v. Deere.*

The claimed invention as set out in independent claim 14, comprises in part:

> 14. A method for estimating a length of tape on a reel, comprising:
> ***measuring a first angular position of a tape supply reel;***
> ***measuring a second angular position of a tape take-up reel;***
> ***measuring a third angular position of a capstan engaging the tape; and,***
> ***estimating said length of tape by a processor employing a Kalman filter, said Kalman filter responsive to at least one of said first angular position of said tape supply reel, said second angular position of said tape take-up reel, and said third angular position of said capstan.***

Applicant respectfully urges that Applicant's claimed novel ***estimating said length of tape by a processor employing a Kalman filter, said Kalman filter responsive to at least one of said first angular position of said tape supply reel, said second angular position of said tape take-up reel, and said third angular position of said capstan*** are absent from all cited art, including Applicant's admitted prior art, Hermanns and Macchia.

Applicant respectfully urges that the cited art is legally precluded from rendering the claimed invention obvious under 35 U.S.C. 103 because of the total absence in any of the cited art of Applicant's claimed ***estimating said length of tape by a processor employing a Kalman filter, said Kalman filter responsive to at least one of said first angular position of said tape supply reel, said second angular position of said tape take-up reel, and said third angular position of said capstan***.

Again, an analysis under *Graham v. Deere*, 383 U.S. 1, 148 U.S.P.Q. 459, (1966), and cited in MPEP 706.02 (m), comes to the same conclusion, that the claimed invention is novel and non-obvious.

The three analytic criteria under *Graham v. Deer* are:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

Particularly, the absence of the claimed
estimating said length of tape by a processor employing a Kalman filter, said Kalman filter responsive to at least one of said first angular position of said tape supply reel, said second angular position of said tape take-up reel, and said third angular position of said capstan

in all cited art leads to the conclusion that the differences between the prior art and the claims at issue could not be obvious to a person skilled in the art, under the legal criteria set out in *Grahm v. Deere*.

The claimed invention, as set out in representative claim 15, comprises in part:

> 15. A method for estimating a length of tape on one or more reels, comprising:
> ***measuring a first angular position of a tape supply reel of said one or more reels;***
> ***measuring a second angular position of a tape take-up reel of said one or more reels;***
> ***measuring a third angular position of a capstan engaging the tape;***
> ***measuring a fourth angular position of a tape tension arm;***
> ***selecting either said tape supply reel or said take-up reel as a selected reel; and,***
> ***estimating said length of tape by a processor employing a Kalman filter, said Kalman filter responsive to said angular position of said selected reel, said third angular position of said capstan, and said fourth angular position of said tape tension arm.***

Applicant respectfully urges that Applicant's claimed novel

> ***measuring a first angular position of a tape supply reel of said one or more reels;***
> ***measuring a second angular position of a tape take-up reel of said one or more reels;***
> ***measuring a third angular position of a capstan engaging the tape;***
> ***measuring a fourth angular position of a tape tension arm;***
> ***selecting either said tape supply reel or said take-up reel as a selected reel; and,***
> ***estimating said length of tape by a processor employing a Kalman filter, said Kalman filter responsive to said angular position of said selected reel, said third angular position of said capstan, and said fourth angular position of said tape tension arm.***

are absent from all cited art, including Applicant's admitted prior art, Hermanns and Macchia.

Applicant respectfully urges that the cited art is legally precluded from rendering the claimed invention obvious under 35 U.S.C. 103 because of the total absence in any of the cited art of Applicant's claimed

> ***estimating said length of tape by a processor employing a Kalman filter, said Kalman filter responsive to said angular position of said selected reel, said third angular position of said capstan, and said fourth angular position of said tape tension arm.***

Again, an analysis under *Graham v. Deere*, 383 U.S. 1, 148 U.S.P.Q. 459, (1966), and cited in MPEP 706.02 (m), comes to the same conclusion, that the claimed invention is novel and non-obvious.

The three analytic criteria under *Graham v. Deer* are:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

Particularly, the absence of the claimed

> ***estimating said length of tape by a processor employing a Kalman filter, said Kalman filter responsive to said angular position of said selected reel, said third angular position of said capstan, and said fourth angular position of said tape tension arm.***

in all cited art leads to the conclusion that the differences between the prior art and the claims at issue could not be obvious to a person skilled in the art, under the legal criteria set out in *Grahm v. Deere*.

The claimed invention, as set out in representative claim 17, comprises in part:

17. A method for estimating the amount of tape on a tape reel, comprising:
measuring a first angular position of said tape reel;
measuring a second angular position of a cylindrical member engaging and rotating with the tape as the tape moves along a tape path;
measuring a third angular position of a tension arm engaging the tape between said reel and said cylindrical member; and,
estimating how much tape is on said tape reel by a processor employing a Kalman filter, said Kalman filter responsive to said first angular position of said tape reel, said second angular position of said cylindrical member, and said third angular position of said tension arm.

Applicant respectfully urges that Applicant's claimed novel

measuring a first angular position of said tape reel;
measuring a second angular position of a cylindrical member engaging and rotating with the tape as the tape moves along a tape path;
measuring a third angular position of a tension arm engaging the tape between said reel and said cylindrical member; and,
estimating how much tape is on said tape reel by a processor employing a Kalman filter, said Kalman filter responsive to said first angular position of said tape reel, said second angular position of said cylindrical member, and said third angular position of said tension arm.

are absent from all cited art, including Applicant's admitted prior art, Hermanns and Macchia.

Applicant respectfully urges that the cited art is legally precluded from rendering the claimed invention obvious under 35 U.S.C. 103 because of the total absence in any of the cited art of Applicant's claimed

measuring a first angular position of said tape reel;

measuring a second angular position of a cylindrical member engaging and rotating with the tape as the tape moves along a tape path;

measuring a third angular position of a tension arm engaging the tape between said reel and said cylindrical member; and,

estimating how much tape is on said tape reel by a processor employing a Kalman filter, said Kalman filter responsive to said first angular position of said tape reel, said second angular position of said cylindrical member, and said third angular position of said tension arm .

Again, an analysis under *Graham v. Deere*, 383 U.S. 1, 148 U.S.P.Q. 459, (1966), and cited in MPEP 706.02 (m), comes to the same conclusion, that the claimed invention is novel and non-obvious.

The three analytic criteria under *Graham v. Deer* are:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

Particularly, the absence of the claimed

estimating how much tape is on said tape reel by a processor employing a Kalman filter, said Kalman filter responsive to said first angular position of said tape reel, said second angular position of said cylindrical member, and said third angular position of said tension arm.

in all cited art leads to the conclusion that the differences between the prior art and the claims at issue could not be obvious to a person skilled in the art, under the legal criteria set out in *Grahm v. Deere.*

The claimed invention, as set out in representative claim 20, comprises in part,

20. A system for measuring how much tape is on a reel from and to which tape is unwound and wound respectively during the rotation of the reel as the tape is moved along a tape path, comprising:

a cylindrical member engaging the tape at a position along the tape path that establishes a tape path length from the reel, said cylindrical member engaging said tape, said cylindrical member rotating as the tape is moved along the tape path;

a first angular position transducer for measuring a first angular position of said reel as the tape is moved along the tape path;

a second angular position transducer for measuring a second angular position of the cylindrical member as the tape is moved along the tape path; and

a processor including a Kalman filter responsive to the first and second angular positions measured by the first and second angular position transducers for calculating how much tape is on said reel.

Applicant respectfully urges that Applicant's claimed novel

a cylindrical member engaging the tape at a position along the tape path that establishes a tape path length from the reel, said cylindrical member engaging said tape, said cylindrical member rotating as the tape is moved along the tape path;

a first angular position transducer for measuring a first angular position of said reel as the tape is moved along the tape path;

a second angular position transducer for measuring a second angular position of the cylindrical member as the tape is moved along the tape path; and

a processor including a Kalman filter responsive to the first and second angular positions measured by the first and second angular position transducers for calculating how much tape is on said reel.

are absent from all cited art, including Applicant's admitted prior art, Hermanns and Macchia.

Applicant respectfully urges that the cited art is legally precluded from rendering the claimed invention obvious under 35 U.S.C. 103 because of the total absence in any of the cited art of Applicant's claimed

a cylindrical member engaging the tape at a position along the tape path that establishes a tape path length from the reel, said cylindrical member engaging said tape, said cylindrical member rotating as the tape is moved along the tape path;

a first angular position transducer for measuring a first angular position of said reel as the tape is moved along the tape path;

a second angular position transducer for measuring a second angular position of the cylindrical member as the tape is moved along the tape path; and

a processor including a Kalman filter responsive to the first and second angular positions measured by the first and second angular position transducers for calculating how much tape is on said reel.

Again, an analysis under *Graham v. Deere*, 383 U.S. 1, 148 U.S.P.Q. 459, (1966), and cited in MPEP 706.02 (m), comes to the same conclusion, that the claimed invention is novel and non-obvious.

The three analytic criteria under *Graham v. Deer* are:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

Particularly, the absence of the claimed

a cylindrical member engaging the tape at a position along the tape path that establishes a tape path length from the reel, said cylindrical member engaging said tape, said cylindrical member rotating as the tape is moved along the tape path;

a first angular position transducer for measuring a first angular position of said reel as the tape is moved along the tape path;

a second angular position transducer for measuring a second angular position of the cylindrical member as the tape is moved along the tape path; and

a processor including a Kalman filter responsive to the first and second angular positions measured by the first and second angular position transducers for calculating how much tape is on said reel.

in all cited art leads to the conclusion that the differences between the prior art and the claims at issue could not be obvious to a person skilled in the art, under the legal criteria set out in *Grahm v. Deere*.

The claimed invention as set out in representative claim 25, comprises in part,

> 25. A method for measuring how much tape is on a reel from and to which tape is unwound and wound respectively during the rotation of the reel as the tape is moved along a tape path, comprising:
>
> ***measuring the amount of rotation by the reel as the tape is unwound from and/or wound onto the reel;***
>
> ***measuring the amount of movement of the tape along the tape path as the tape is unwound from and/or wound onto the reel, the movement of the tape measured at a position along the tape path that establishes a tape path length from the reel; and***
>
> ***calculating by a process that employs a Kalman filter how much tape is on the reel in response to the measured amount of rotation by the reel and the measured amount of movement of the tape.***

Applicant respectfully urges that Applicant's claimed novel

measuring the amount of rotation by the reel as the tape is unwound from and/or wound onto the reel;

measuring the amount of movement of the tape along the tape path as the tape is unwound from and/or wound onto the reel, the movement of the tape measured at a position along the tape path that establishes a tape path length from the reel; and

calculating by a process that employs a Kalman filter how much tape is on the reel in response to the measured amount of rotation by the reel and the measured amount of movement of the tape

are absent from all cited art, including Applicant's admitted prior art, Hermanns and Macchia.

Applicant respectfully urges that the cited art is legally precluded from rendering the claimed invention obvious under 35 U.S.C. 103 because of the total absence in any of the cited art of Applicant's claimed ***calculating by a process that employs a Kalman filter how much tape is on the reel in response to the measured amount of rotation by the reel and the measured amount of movement of the tape.***

Again, an analysis under *Graham v. Deere*, 383 U.S. 1, 148 U.S.P.Q. 459, (1966), and cited in MPEP 706.02 (m), comes to the same conclusion, that the claimed invention is novel and non-obvious.

The three analytic criteria under *Graham v. Deer* are:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

Particularly, the absence of the claimed

measuring the amount of rotation by the reel as the tape is unwound from and/or wound onto the reel;

measuring the amount of movement of the tape along the tape path as the tape is unwound from and/or wound onto the reel, the movement of the tape measured at a position along the tape path that establishes a tape path length from the reel; and

calculating by a process that employs a Kalman filter how much tape is on the reel in response to the measured amount of rotation by the reel and the measured amount of movement of the tape

in all cited art leads to the conclusion that the differences between the prior art and the claims at issue could not be obvious to a person skilled in the art, under the legal criteria set out in *Grahm v. Deere.*

The claimed invention as set out in representative claim 34, comprises in part

34. A method for estimating a length of tape on a reel, comprising:

a. choosing a variable to be measured, said variable related to estimating a length of tape on a reel;

b. selecting a minimum and maximum acceptable measurement value of said variable;

c. selecting a maximum acceptable variance of said variable;

d. recording an individual measurement of said variable;

e. determining if said individual measurement's variance is greater than said maximum acceptable variance;

f. determining if a three sigma-interval around said individual measurement is not at least partially included within an interval from said minimum to said maximum acceptable measurement values;

if the determinations in steps e OR f prove true, ignoring the individual measurement and basing the current Kalman filter estimate on other measurements and on previous Kalman filter estimates.

Applicant respectfully urges that Applicant's claimed novel

a. choosing a variable to be measured, said variable related to estimating a length of tape on a reel;

b. selecting a minimum and maximum acceptable measurement value of said variable;

c. selecting a maximum acceptable variance of said variable;

d. recording an individual measurement of said variable;

e. determining if said individual measurement's variance is greater than said maximum acceptable variance;

f. determining if a three sigma-interval around said individual measurement is not at least partially included within an interval from said minimum to said maximum acceptable measurement values;

if the determinations in steps e OR f prove true, ignoring the individual measurement and basing the current Kalman filter estimate on other measurements and on previous Kalman filter estimates.

are absent from all cited art, including Applicant's admitted prior art, Hermanns and Macchia.

Applicant respectfully urges that the cited art is legally precluded from rendering the claimed invention obvious under 35 U.S.C. 103 because of the total absence in any of the cited art of Applicant's claimed

a. choosing a variable to be measured, said variable related to estimating a length of tape on a reel;
b. selecting a minimum and maximum acceptable measurement value of said variable;
c. selecting a maximum acceptable variance of said variable;
d. recording an individual measurement of said variable;
e. determining if said individual measurement's variance is greater than said maximum acceptable variance;
f. determining if a three sigma-interval around said individual measurement is not at least partially included within an interval from said minimum to said maximum acceptable measurement values;
if the determinations in steps e OR f prove true, ignoring the individual measurement and basing the current Kalman filter estimate on other measurements and on previous Kalman filter estimates.

Again, an analysis under *Graham v. Deere*, 383 U.S. 1, 148 U.S.P.Q. 459, (1966), and cited in MPEP 706.02 (m), comes to the same conclusion, that the claimed invention is novel and non-obvious.

The three analytic criteria under *Graham v. Deer* are:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

Particularly, the absence of the claimed

a. choosing a variable to be measured, said variable related to estimating a length of tape on a reel;

b. selecting a minimum and maximum acceptable measurement value of said variable;
c. selecting a maximum acceptable variance of said variable;
d. recording an individual measurement of said variable;
e. determining if said individual measurement's variance is greater than said maximum acceptable variance;
f. determining if a three sigma-interval around said individual measurement is not at least partially included within an interval from said minimum to said maximum acceptable measurement values;
if the determinations in steps e OR f prove true, ignoring the individual measurement and basing the current Kalman filter estimate on other measurements and on previous Kalman filter estimates.

in all cited art leads to the conclusion that the differences between the prior art and the claims at issue could not be obvious to a person skilled in the art, under the legal criteria set out in *Grahm v. Deere*.

The claimed invention as set out in representative claim 35, comprises in part,

35. A method for estimating a length of tape on a reel, comprising:
a. choosing a variable to be measured, said variable related to estimating a length of tape on a reel;
b. selecting a minimum and maximum acceptable measurement value of said variable;
c. selecting a maximum acceptable variance of said variable;
d. recording an individual measurement;
e. determining if said individual measurement's variance is greater than said maximum acceptable variance;
if the determination in step e proves true, ignoring the individual measurement and basing the current Kalman filter estimate on other measurements and on previous Kalman filter estimates.

Applicant respectfully urges that Applicant's claimed novel

a. choosing a variable to be measured, said variable related to estimating a length of tape on a reel;
b. selecting a minimum and maximum acceptable measurement value of said variable;
c. selecting a maximum acceptable variance of said variable;
d. recording an individual measurement;
e. determining if said individual measurement's variance is greater than said maximum acceptable variance;
if the determination in step e proves true, ignoring the individual measurement and basing the current Kalman filter estimate on other measurements and on previous Kalman filter estimates.

are absent from all cited art, including Applicant's admitted prior art, Hermanns and Macchia.

Applicant respectfully urges that the cited art is legally precluded from rendering the claimed invention obvious under 35 U.S.C. 103 because of the total absence in any of the cited art of Applicant's claimed

a. choosing a variable to be measured, said variable related to estimating a length of tape on a reel;
b. selecting a minimum and maximum acceptable measurement value of said variable;
c. selecting a maximum acceptable variance of said variable;
d. recording an individual measurement;
e. determining if said individual measurement's variance is greater than said maximum acceptable variance;
if the determination in step e proves true, ignoring the individual measurement and basing the current Kalman filter estimate on other measurements and on previous Kalman filter estimates.

Again, an analysis under *Graham v. Deere*, 383 U.S. 1, 148 U.S.P.Q. 459, (1966), and cited in MPEP 706.02 (m), comes to the same conclusion, that the claimed invention is novel and non-obvious.

The three analytic criteria under *Graham v. Deer* are:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

Particularly, the absence of the claimed

a. choosing a variable to be measured, said variable related to estimating a length of tape on a reel;
b. selecting a minimum and maximum acceptable measurement value of said variable;
c. selecting a maximum acceptable variance of said variable;
d. recording an individual measurement;
e. determining if said individual measurement's variance is greater than said maximum acceptable variance;
if the determination in step e proves true, ignoring the individual measurement and basing the current Kalman filter estimate on other measurements and on previous Kalman filter estimates.

in all cited art leads to the conclusion that the differences between the prior art and the claims at issue could not be obvious to a person skilled in the art, under the legal criteria set out in *Grahm v. Deere*.

The claimed invention as set out in representative claim 36, comprises in part,

36. A method for estimating a length of tape on a reel, comprising:
a. choosing a variable to be measured, said variable related to estimating a length of tape on a reel;
b. selecting a minimum and maximum acceptable measurement value of said variable;
c. selecting a maximum acceptable variance of said variable;
d. recording an individual measurement;
e. determining if a three sigma-interval around said individual measurement is not at least partially included within an interval from said minimum to said maximum acceptable measurement values;

if the determination in step e proves true, ignoring the individual measurement and basing the current Kalman filter estimate on other measurements and on previous Kalman filter estimates.

Applicant respectfully urges that Applicant's claimed novel

a. choosing a variable to be measured, said variable related to estimating a length of tape on a reel;
b. selecting a minimum and maximum acceptable measurement value of said variable;
c. selecting a maximum acceptable variance of said variable;
d. recording an individual measurement;
e. determining if a three sigma-interval around said individual measurement is not at least partially included within an interval from said minimum to said maximum acceptable measurement values;
if the determination in step e proves true, ignoring the individual measurement and basing the current Kalman filter estimate on other measurements and on previous Kalman filter estimates.

are absent from all cited art, including Applicant's admitted prior art, Hermanns and Macchia.

Applicant respectfully urges that the cited art is legally precluded from rendering the claimed invention obvious under 35 U.S.C. 103 because of the total absence in any of the cited art of Applicant's claimed

a. choosing a variable to be measured, said variable related to estimating a length of tape on a reel;
b. selecting a minimum and maximum acceptable measurement value of said variable;
c. selecting a maximum acceptable variance of said variable;
d. recording an individual measurement;
e. determining if a three sigma-interval around said individual measurement is not at least partially included within an interval from said minimum to said maximum acceptable measurement values;
if the determination in step e proves true, ignoring the individual measurement and basing the current Kalman filter estimate on other measurements and on previous Kalman filter estimates.

Again, an analysis under *Graham v. Deere*, 383 U.S. 1, 148 U.S.P.Q. 459, (1966), and cited in MPEP 706.02 (m), comes to the same conclusion, that the claimed invention is novel and non-obvious.

The three analytic criteria under *Graham v. Deer* are:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

Particularly, the absence of the claimed

a. choosing a variable to be measured, said variable related to estimating a length of tape on a reel;

b. selecting a minimum and maximum acceptable measurement value of said variable;

c. selecting a maximum acceptable variance of said variable;

d. recording an individual measurement;

e. determining if a three sigma-interval around said individual measurement is not at least partially included within an interval from said minimum to said maximum acceptable measurement values;

if the determination in step e proves true, ignoring the individual measurement and basing the current Kalman filter estimate on other measurements and on previous Kalman filter estimates.

in all cited art leads to the conclusion that the differences between the prior art and the claims at issue could not be obvious to a person skilled in the art, under the legal criteria set out in *Grahm v. Deere*.

All independent claims are believed to be in condition for allowance.

All dependent claims are believed to be dependent from allowable independent claims, and therefore in condition for allowance.

Favorable action is respectfully solicited.

Please charge any additional fee occasioned by this paper to our Deposit Account No. 03-1237.

Respectfully submitted,

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MARK-UP PAGES FOR THE DECEMBER 19, 2002, AMENDMENT TO U.S. PATENT APPLICATION SER. NO. 09/441,003

The replacement for the FIRST full paragraph of page PAGE resulted from the following changes:

COPY PARAGRAPH TO BE AMENDED HERE.

The replacement for claim CLAIM resulted from the following changes:

COPY CLAIM TO BE AMENDED HERE.